

INDIA'S & SOUTH ASIA'S ENERGY CHALLENGES : SOME ILLUSTRATIVE EXAMPLES OF USAID RESPONSE

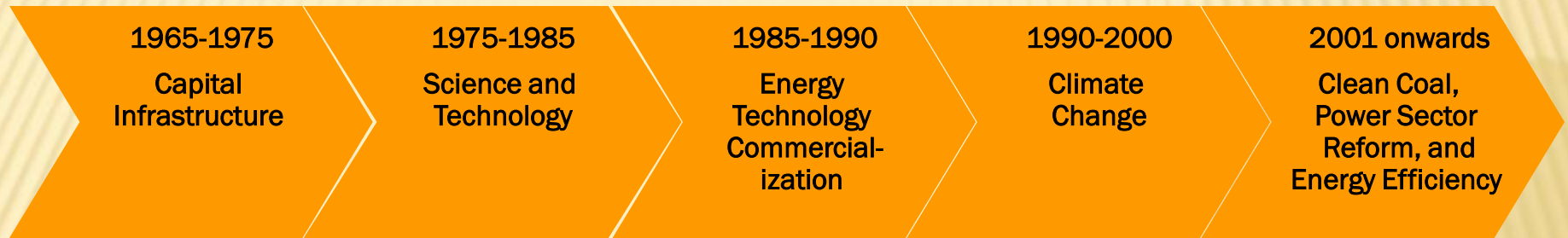


S. Padmanaban
SAIS, JHU

BACKGROUND

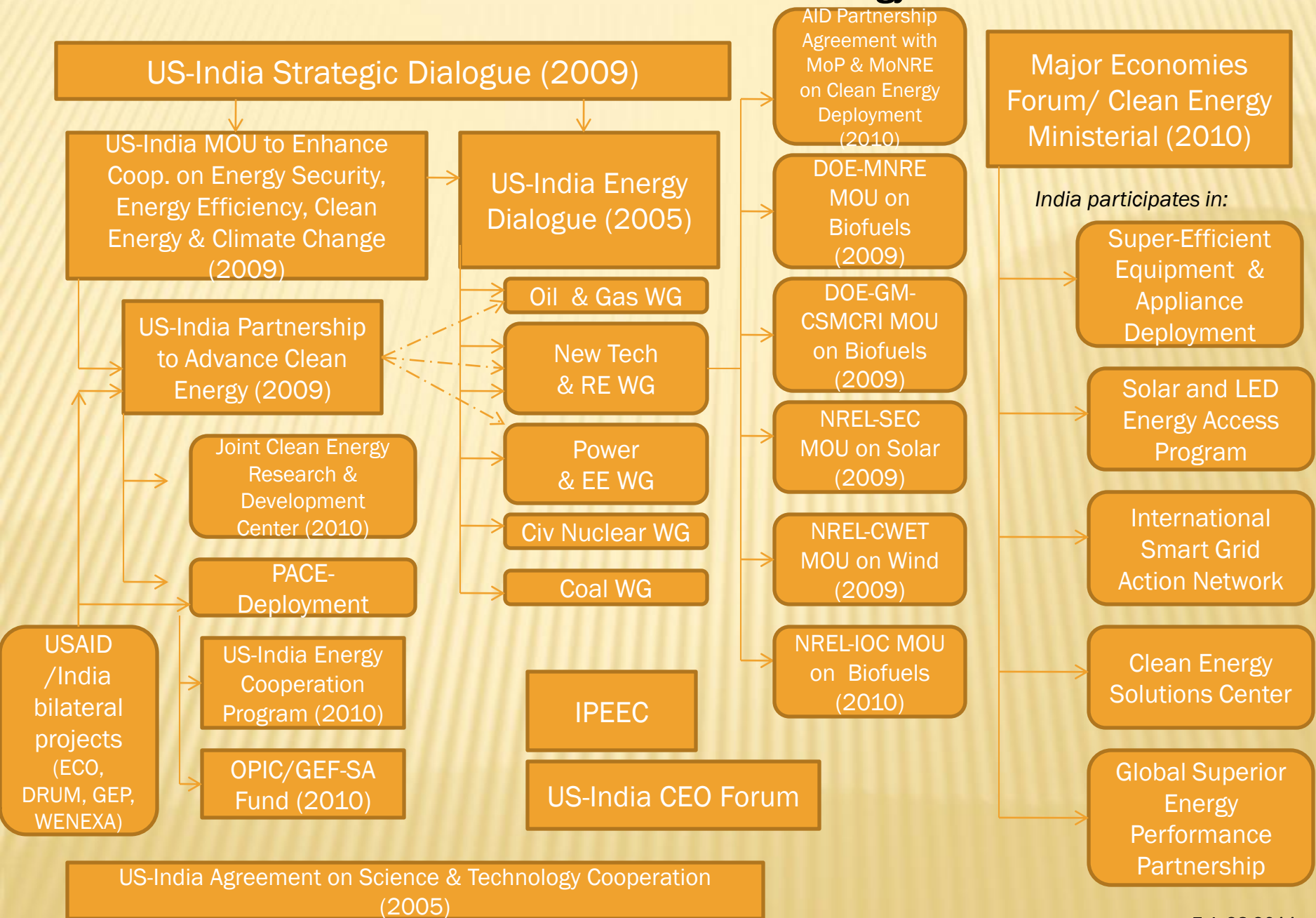
- Twin global challenges of the 21st century – Climate Change and Energy Security.
- India has second fastest growing economy with middle class projected to grow from 50 million to 500 million.
- Integrated Energy Policy reports- “to deliver a sustained growth rate of 8% through 2031-32 and to meet the lifeline energy needs of all citizens, India needs, at the very least, to increase its primary energy supply by 3 to 4 times and, its electricity generation capacity by 5 to 6 times of its 2003-04 levels.
- India plans to increase its power generation capacity from current capacity of 168,000 MW to nearly 800,000 MW by 2030 i.e. about 500 MW every week over the next 25 years.
- India already the fourth biggest GHG emitter.
- Cross-border energy trade: The emergence of sub-regional grids

HISTORY OF U.S./INDIA'S ENERGY PROGRAM



- Focus Today:
 - Clean energy,
 - Low Carbon Development
 - Energy Efficiency
 - Electricity Distribution Reform
 - Water-Energy Co-management.
 - Regional Energy Trade

US-India Collaboration on Clean Energy



Major Economies Forum/ Clean Energy Ministerial (2010)

India participates in:

Super-Efficient Equipment & Appliance Deployment

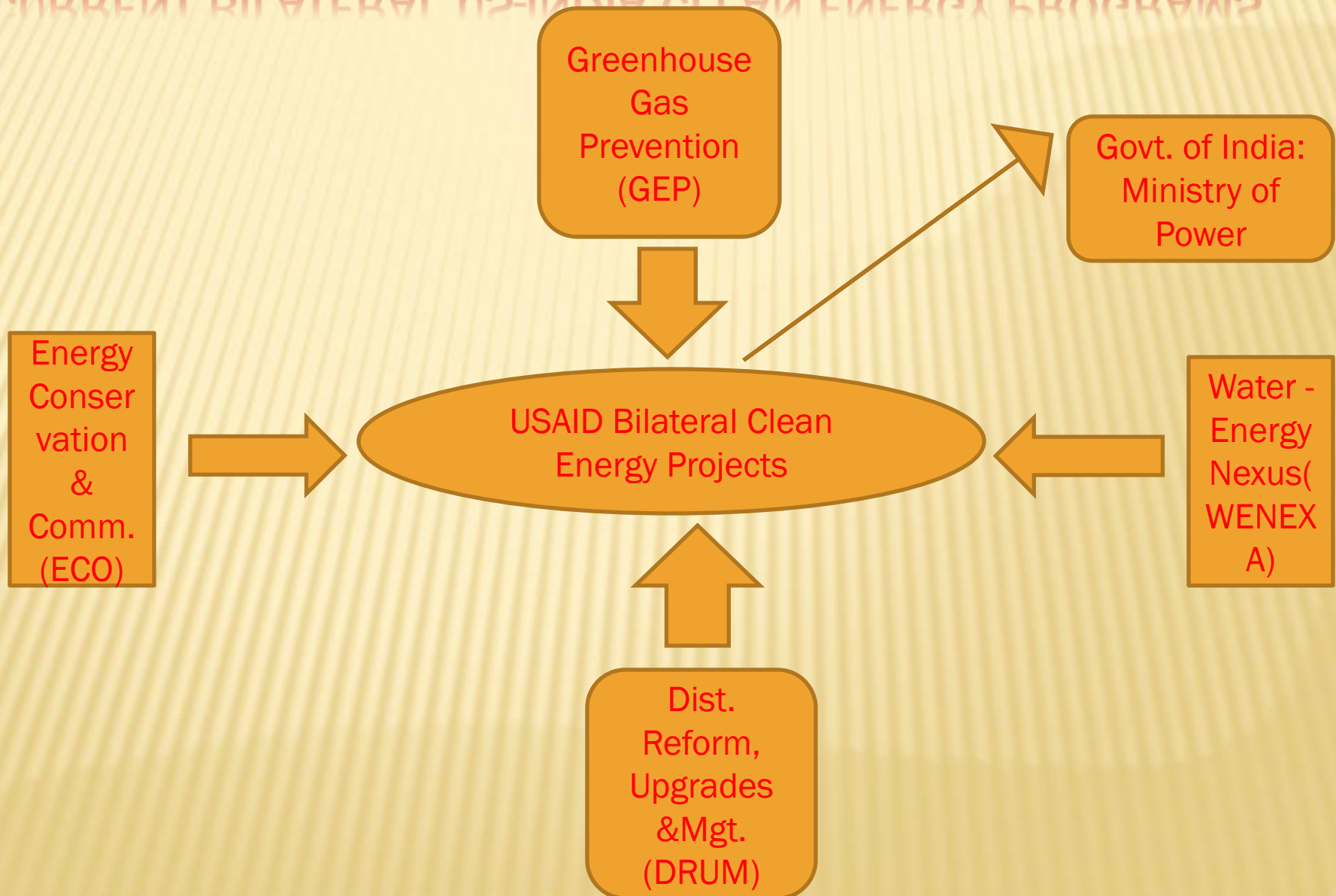
Solar and LED Energy Access Program

International Smart Grid Action Network

Clean Energy Solutions Center

Global Superior Energy Performance Partnership

CURRENT BILATERAL US-INDIA CLEAN ENERGY PROGRAMS



USAID SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY (SARI/ENERGY)

SARI/E Participating Countries:



SARI/E Objective FY 2008 - 2011:
PROMOTE ENERGY SECURITY

SARI/E Activity Areas:

1. **Cross Border Energy Trade** – infrastructure interconnections
2. **Energy Markets Formulation** – precursor and full mechanisms for transparent trade practices
3. **Clean Energy Access** - efficiency, conservation, and renewable sources
4. **Afghanistan Power Sector Capacity Building**

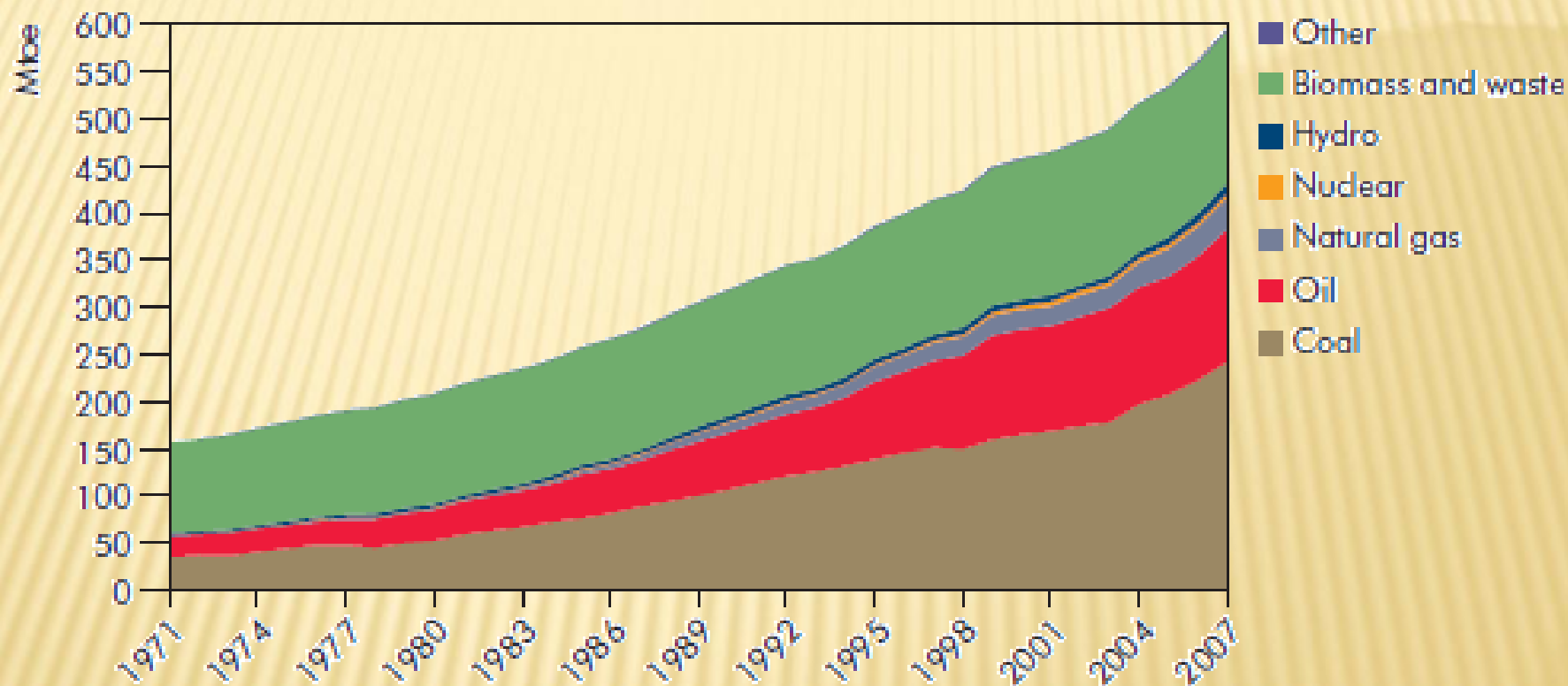
PROVEN ENERGY RESERVES IN INDIA AND IN THE WORLD, 2008

	Coal (bt)	Crude oil (Mt)	Natural gas (bcm)
Proven reserves : India	58.6	769	1 050
Proven reserves: World	826	170800	185020
Production in 2008: India	0.5	33.5	32.8
Reserve-to-production ratio: India	122	44	60

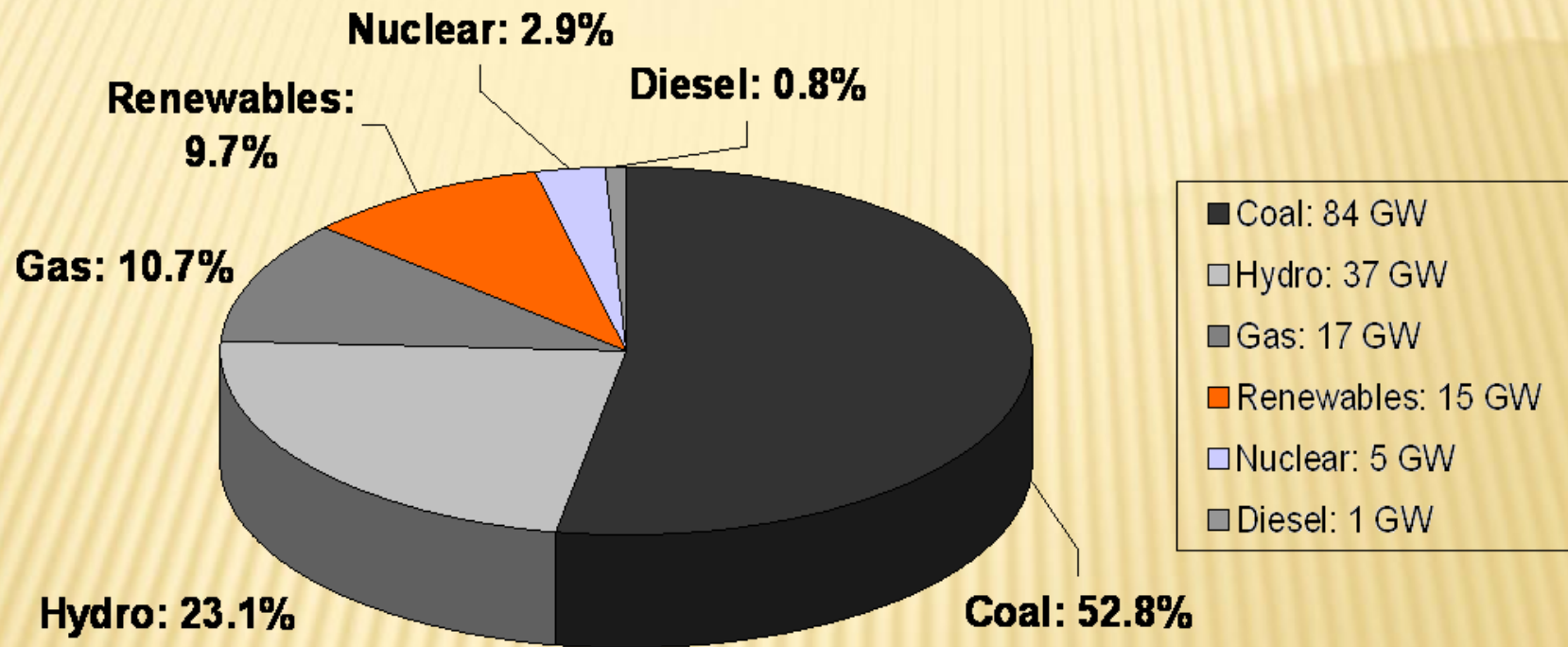
Note: Reserve-to-production ratio indicates the length of time that the recoverable reserves would last if production were to continue at current rates and if no additional reserves could be recovered.

Sources: BP (2009); MPNG (2009).

TOTAL PRIMARY ENERGY SUPPLY IN INDIA

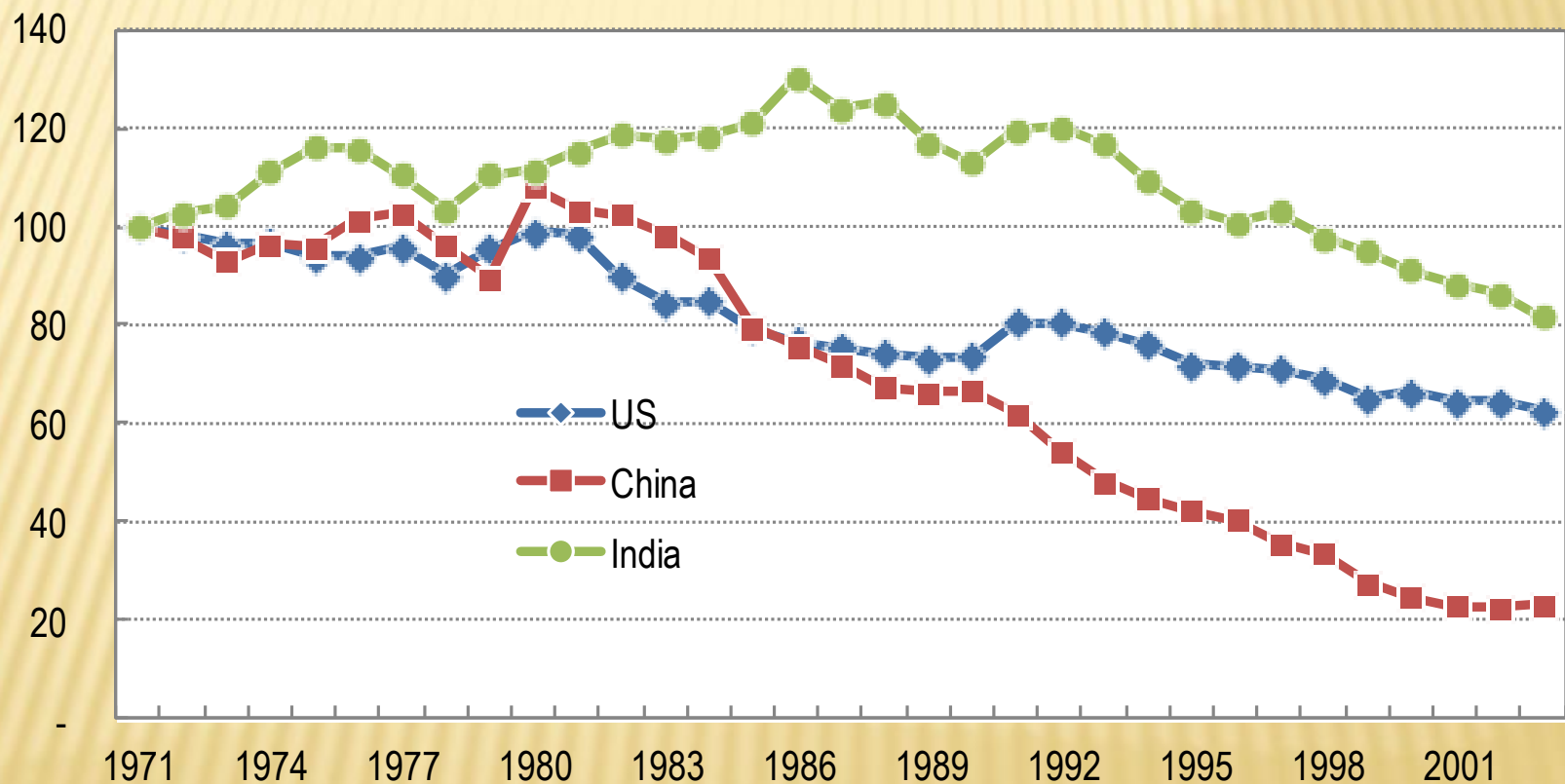


INSTALLED CAPACITIES FOR POWER GENERATION IN INDIA ACCORDING TO THE ENERGY SOURCE (IN %, MARCH 2010)



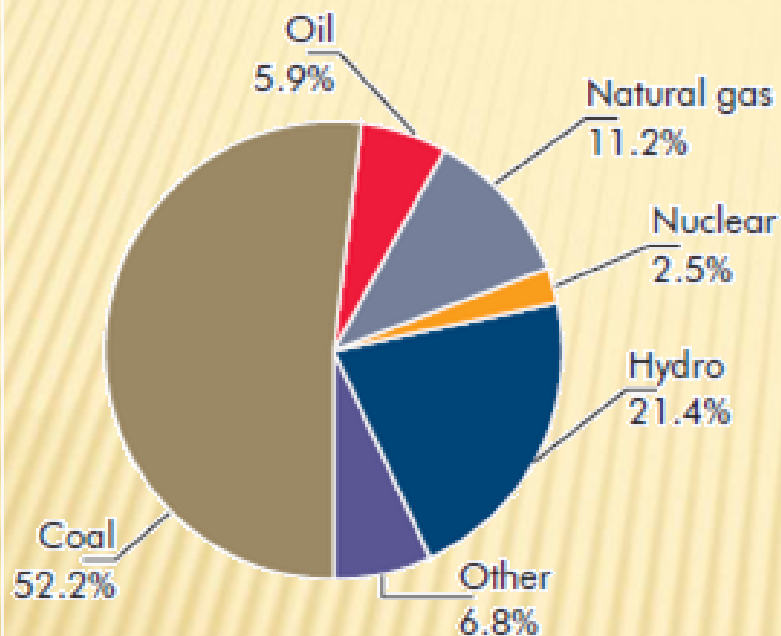
IMPROVEMENT IN INDIA'S INDUSTRIAL ENERGY INTENSITY

Industry Primary Energy Consumption per Value Added
(U.S. \$2000, 1971: 100)

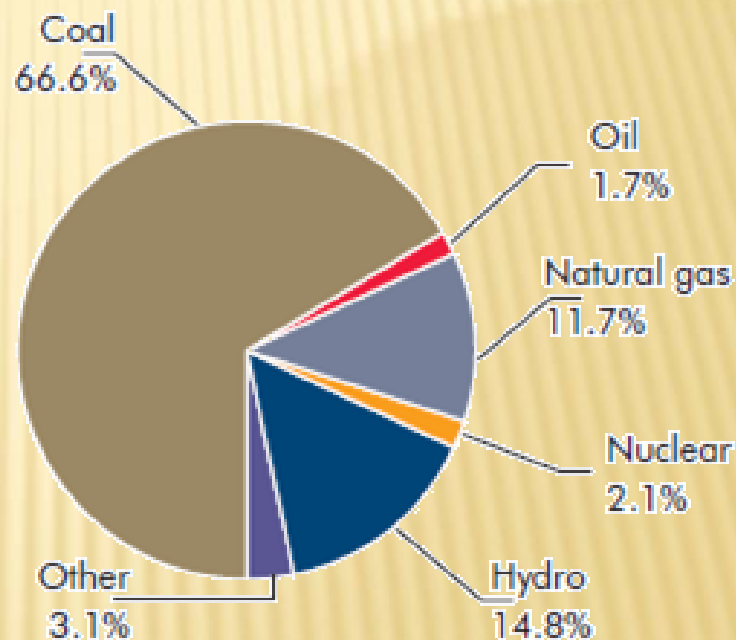


ELECTRICITY GENERATING CAPACITY AND GENERATION FOR INDIA, 2007/2008

Installed capacity 168 GW



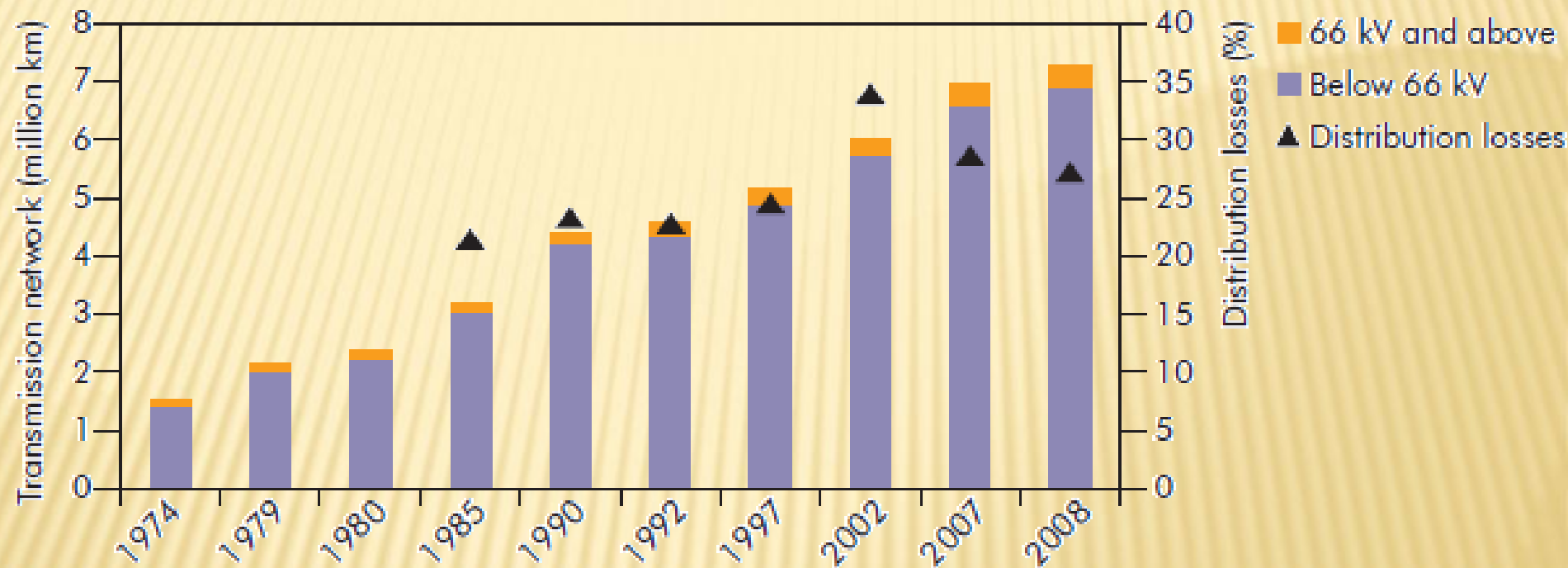
Electricity generation 813 TWh



Note: Includes capacity and generation from utilities and captive power plants.

Source: CEA (2009a).

DEVELOPMENT OF TRANSMISSION NETWORK, AND TRANSMISSION AND DISTRIBUTION LOSSES FOR INDIA



Source: CEA (2009c).

Delhi Distribution Scenario

Need for reforms due to Delhi's grave power problems and deteriorating financial position of DVB.

Age Old Network

High Theft
High loss levels

High Equipment
Burn-outs

Outdated Technology
No Processes



Unprofessional Work Culture

Insensitive Consumer
Service

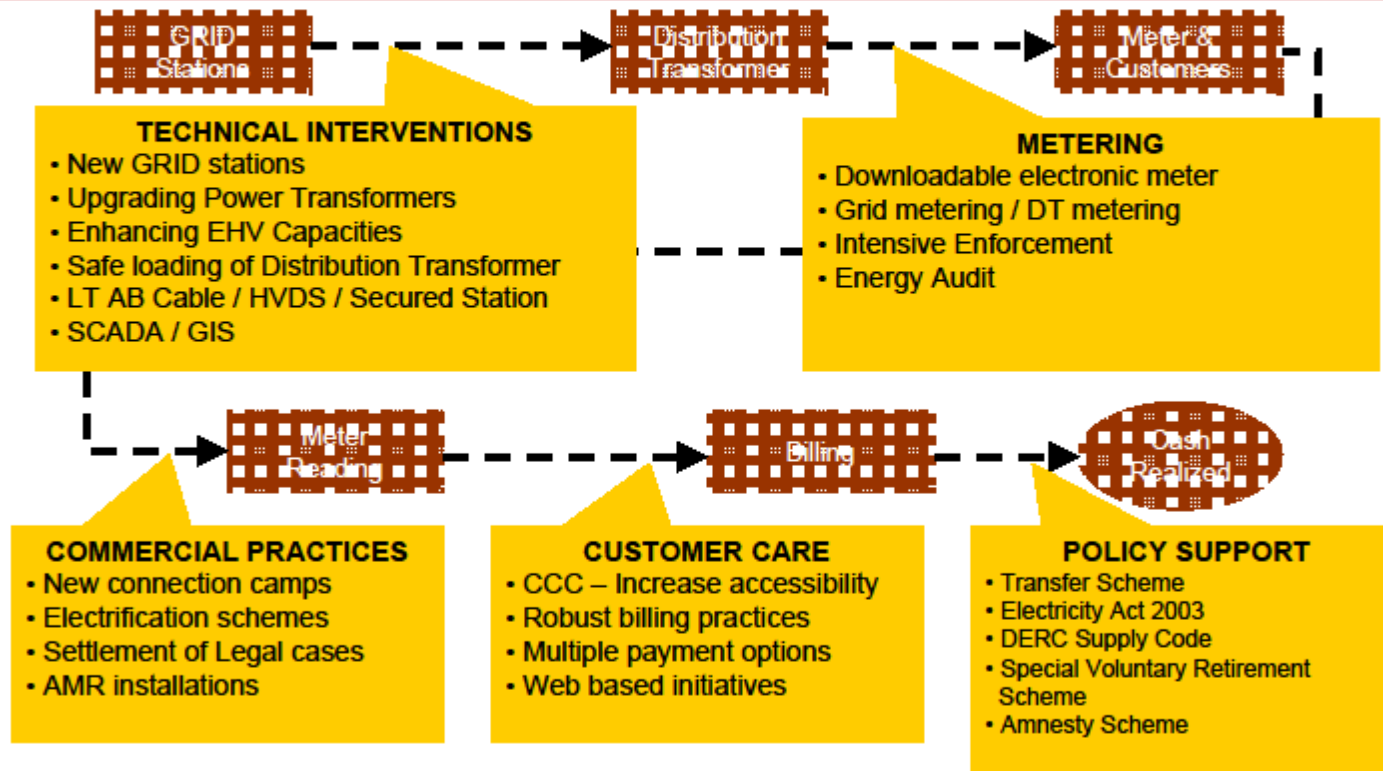
Deep rooted
Corruption

Inadequate Investment

Business not geared to meet Rapid growth in Demand

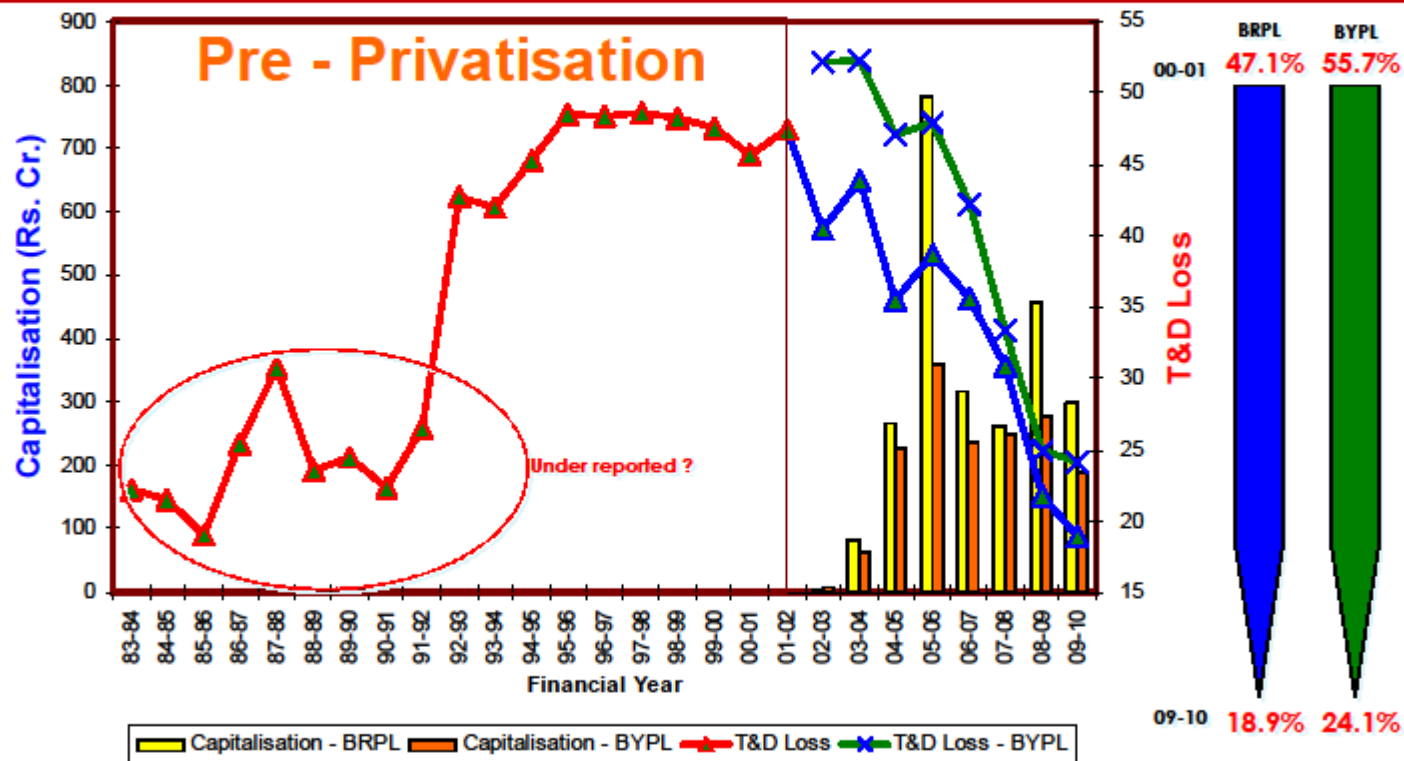
BSES

Processes Re-engineered



Loss Reduction

Transmission and Distribution Loss



BSES

USAID-INDIA GEP PROJECT

EFFICIENT COAL CONVERSION (ECC) COMPONENT

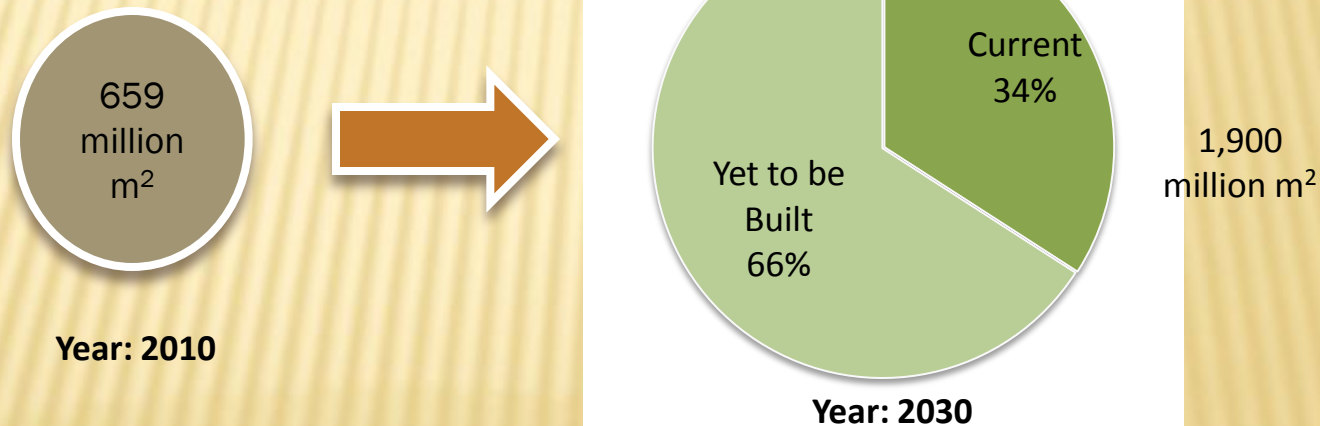
Objective: address efficiency and environmental problems in existing coal-fired power plants

- ❖ Power Plant Efficiency Improvement
- ❖ Plant Condition Monitoring and Assessment
- ❖ Environmental Monitoring and Control
- ❖ Advanced Power Generation
- ❖ Fly Ash Utilization
- ❖ Coal Quality

GROWTH IN THE INDIAN BUILDING SECTOR

Commercial Buildings Growth Forecast

- ❖ Currently, ~ 659 million m² (USAID ECO-III Internal Estimate Using MOSPI, CEA and Benchmarked Energy Use data)
- ❖ In 2030, ~ 1,900 million m² (estimated) *
 - ✓ 66% building stock is yet to be constructed



* Assuming 5-6% Annual Growth

Source: USAID ECO- III Project

GREEN BUILDING SCENARIO



MAIN LINK: Green buildings help retain quality employees. —PHOTO: P.V.SIVAKUMAR

Green buildings transform realty market

Uptake of green buildings is increasing

Driven by changing dynamics, the Indian realty market will undergo a transformation and adopt "green building practices," a new way by which building use natural resources such as water and energy and reduce adverse impact on environment.

"This transformation will be driven by various combinations of regulation, government incentives and changing market dynamics," according to re-design, Asia's first green real estate guide.

Besides, tenants would also help drive the green real estate growth through their corporate social responsibility programmes, desire to attract and retain quality employees and aspiration to improve productivity, states the guide.

"The green market in India started with the developed world shifting some of its back offices to India. Un-

like other markets, the growth in green buildings is largely driven by occupiers," said Joe Varghese, MD, Collier International India, while making out a case for green estate. "In the changing climatic situation, we need to redesign our buildings and also redesign the way in which we transact, develop, value and manage real estate."

He added that 9.9 per cent of residential and 5.4 per cent of commercial buildings account for world green gas emissions. Blindly aping the west may not be the solution to the problem, he said. Joe underlining the need for coming out with local green solution to address the problem in India.

"Green buildings are set to become standard practice and we need to quickly understand them, including how they deliver value to us," said Simon Carter, author of the guide, a leading

property consulting company.

On the cost factor in investing in green buildings, Mr. Carter said "Over-focusing on costs can be very misleading. When markets transform, it is the cost of not having a green building to lease or sell that will be a matter of concern."

"The uptake of green building practices in India is now quick and real estate practices are changing accordingly," he added. India has about 26 built-up buildings covering 1 million sqft.

Of these five have secured plat gold Leed ratings. C 218 buildings have tiered themselves to green certificate, while leading the pace buildings, followed at 35. Banga close to 12 buildings for receiving fication. - PTI

The green building movement is gradually gaining ground in India, but home owners need to be more aware of the issues involved, says Gayatri Rao

The importance of green architecture in today's world cannot be underlined enough. Sustainability as a topic should now come out of the living room and enter the boardroom as more and more end users insist on the environ-



GRUNDFOS, CHENNAI

This building is wonderfully spaced, with an aesthetically 'Low U Glass' double-walled frontage and set amid lush gardens. Within, the work space is geometrically bisected and connected by an aisle with a sky-light glass ceiling that uses a special type of glass which allows the natural sunlight to come in but cuts out the heat.

Along with the ITC Building in Gurgaon, the Grundfos Pumps building is among the first two commercial buildings in India to have won the LEED certification. Installing energy-efficient devices means saving on running costs. "We initially had a connected load of 600 KW (kilowatt), but now our connected load is only 300 KW," explains N. K. Ranganath, managing director, Grundfos. In money terms, the savings on the energy bill payable to the Tamil Nadu Electricity Board is Rs 1.5 lakh a month, which works out to a saving of Rs 18 lakh a year.

— M. R. Venkatesh

- 100 percent on-site sewage treatment with rain water and wastewater being harvested, thus saving millions of gallons per year from reaching the city's overburdened sewerage system
- Reduces dependence on city's water reservoir
- 100 percent waste management, which can be used in two ways - generate organic manure from waste for enhancing green ecosystem within premises and recycle remaining waste for usage
- Green buildings result in 30 to 40 percent energy savings and 20 to 30 percent water use savings. For every one million sqft of constructed green building footprint, the carbon dioxide reduction is around 12,000 tons per annum
- Green building practices offer an opportunity to create environmentally-sound and resource-efficient buildings by using an integrated approach to design

part of Confederation of Indian Industry (CII), has instituted the prestigious Leadership in Energy and Environmental Design (LEED) Platinum rating in India. This is available to both residential as well as commercial buildings. One of IGBC's main objectives is to ensure that the real estate industry in India migrates to creating benchmarks in green buildings across all realty formats. This is just the beginning of what has been called the Green Building Movement.

homes. By having a lawn on the roof, most of the sun's heat can be reflected. Secondly, in many residences electric light has to be switched on even during the daytime. We need to use high performance glass in the construction of the building, which lets diffused natural light enter the homes. Up to 63 percent energy savings can be made this way".

Other ways are to use recycled materials in construction like fly ash, which is a waste material produced in thermal

Business of ecology

TECHNOPOLIS, KOLKATA

Technopolis is expected to earn Rs 50 crore over the next few years by selling carbon credits. The country's first LEED (Leadership in Energy and Environment Design)-certified information-technology building has kickstarted the trend of commercial properties turning green.



Technopolis saves around 87.5 lakh units annually — 35 per cent of its expected energy bills — by using insulated walls, intelligent humidification controls, double-glazed glass windows with low ultra-violet factor, besides solar heat gain coefficient and sensors to control carbon dioxide levels.

The pioneering building, which presently earns Rs 50 lakh annually, has applied for the Clean Development Mechanism scheme under the Kyoto Protocol, which allows developed countries to meet targets by funding environmental-friendly business projects in developing countries and enabling the latter to accumulate carbon credits to sell back to developed nations.

— Drimi Chaudhuri

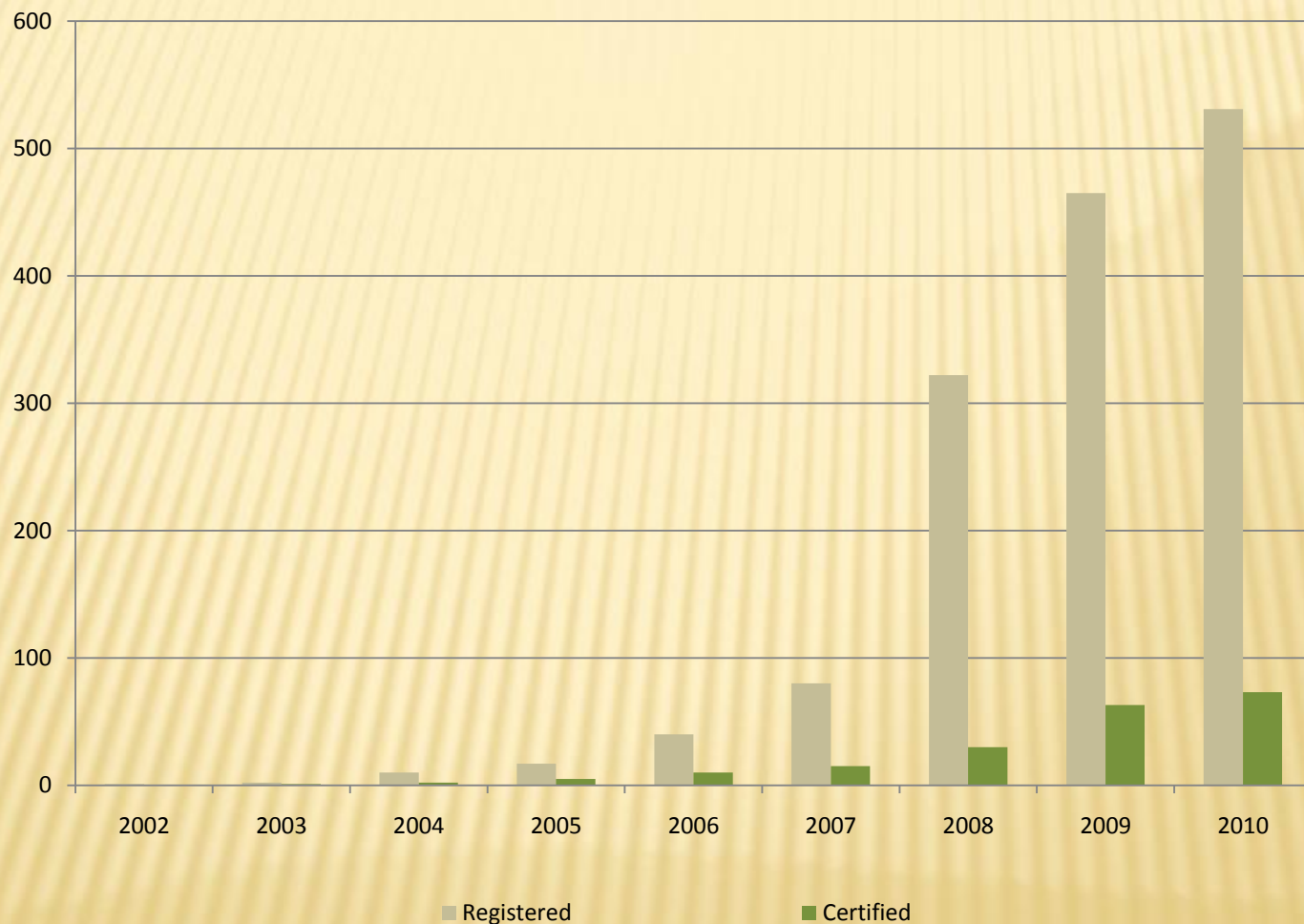
standing (MoI) for facilitating Rated Green Building Certification of various projects on a pan-India. From now onwards project that the companies would be green India implementation same has already begun various projects already. Out of 181 buildings in India, 52 Mumbai.

Buildings account for a significant portion of India's energy consumption at nearly 30 percent. Green building practices offer an opportunity to create environmentally-sound and resource-efficient buildings by using an integrated approach to design.

The International Energy Agency, a policy and research group in Paris, forecast in November that India's energy demand would more than double by 2050. In turn, if policies remain unchanged, per capita emissions will double, it said, but will remain well below the level of industrialised countries today. The Indian construction and infrastructure industry is witnessing unprecedented growth (at nearly 12 percent plus a year) which is nearly twice the

GROWTH OF GREEN BUILDINGS

"LEED INDIA" FROM INDIAN GREEN BUILDING COUNCIL (IGBC)



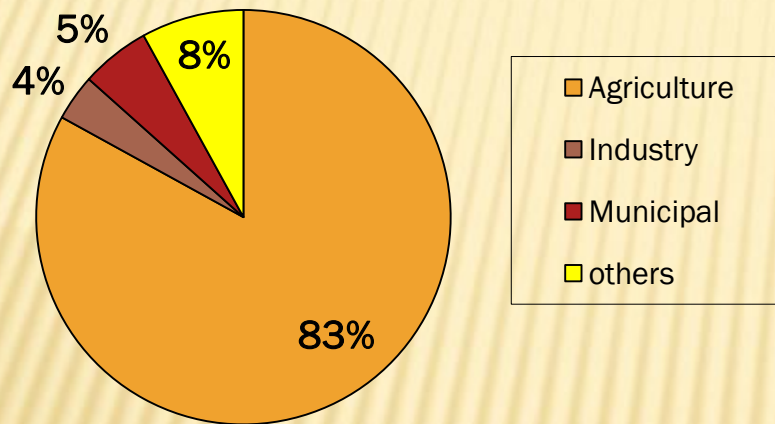
All types of buildings, all over the country :

IT Parks, Offices, Banks, Airport, Convention Centre, Institutions, Hotels, Residential, Factories . . .

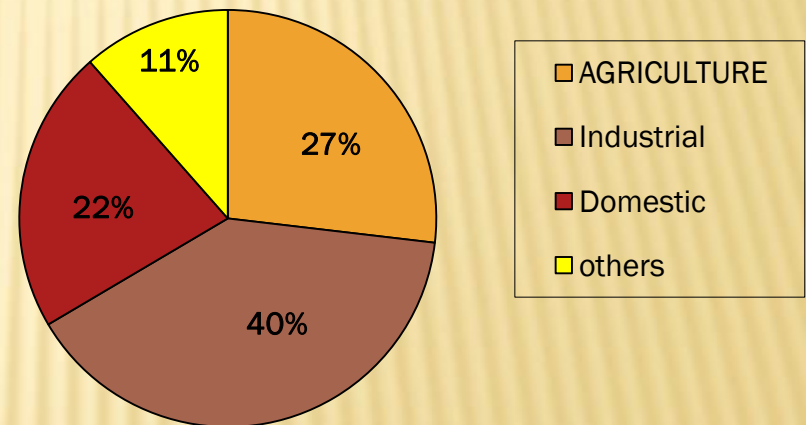
AGRICULTURE'S IMPACT IS SIGNIFICANT

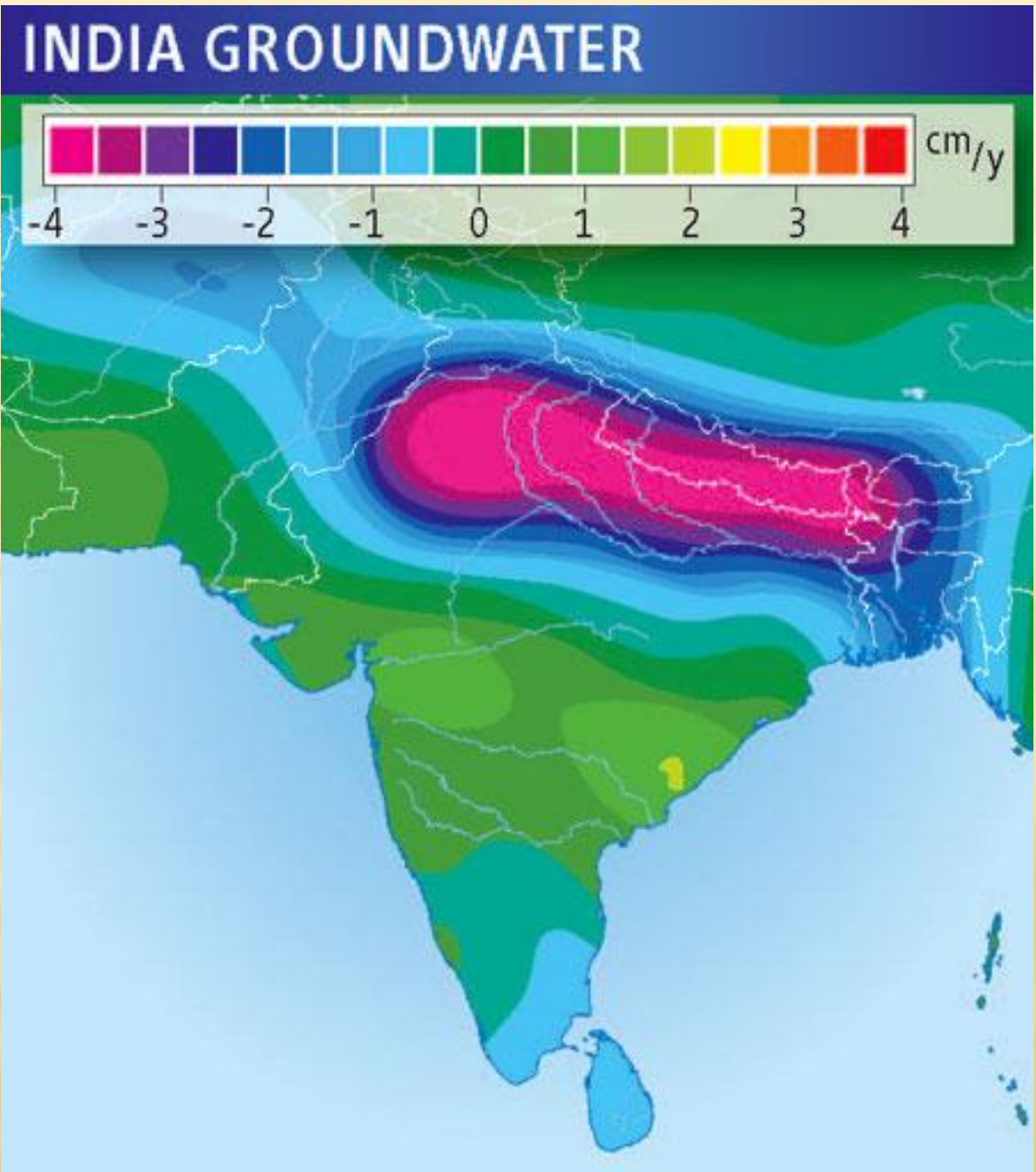
Agriculture is the largest user of water and accounts for about one-third of total power use

Water



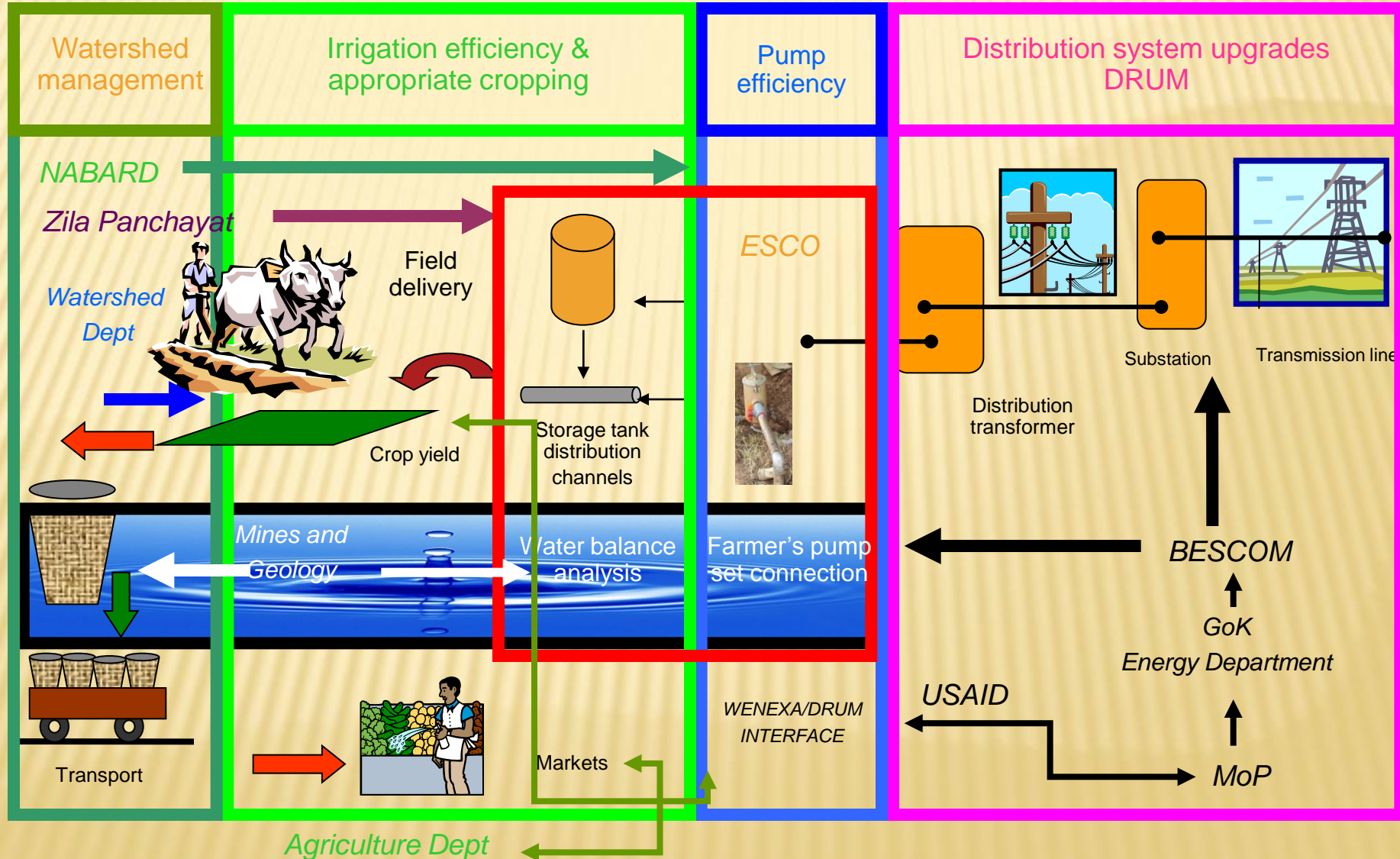
Electricity



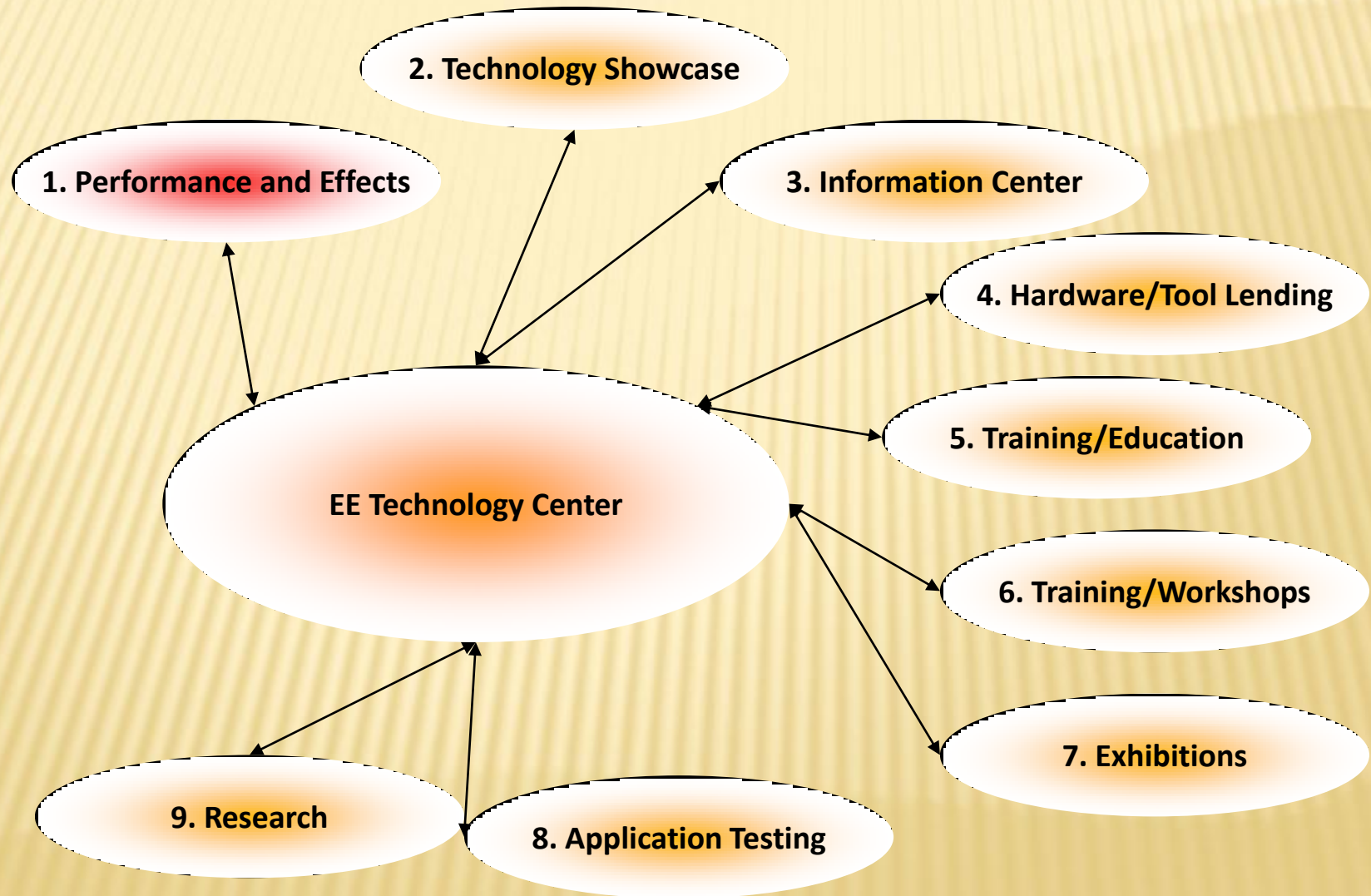


RATE OF CHANGE OF GROUND
WATER RESERVES IN INDIA

WENEXA AGRICULTURE PROJECT COMPONENTS AND COUNTERPARTS



EE CENTER OF EXCELLENCE



EE CENTERS – EXAMPLES OF CENTERS ESTABLISHED BY USAID/INDIA

- ❖ Regional Center for Efficient Lighting in Colombo, Sri Lanka (www.rclsa.net)
- ❖ Green Business Center, Hyderabad, India (www.greenbusinesscentre.org)
- ❖ Center for Electrical Motors & Motor Drives, Hyderabad, India (www.nftdc.org)
- ❖ Center for Efficient Home Appliances, Kolkata, India
- ❖ Center for Industrial Applications of EE, Nagpur, India
- ❖ Center for Energy Efficiency & Environmental Protection (CENPEEP), Delhi, India
- ❖ Women's Institute for Sustainable Energy Research (WISER), Kerala, India
- ❖ Center for Green Buildings , Ahmedabad, India &
- ❖ Center for Micro-Hydel, Kathmandu, Nepal

CII – SOHRABJI GODREJ GREEN BUSINESS CENTRE, HYDERABAD

**A unique Public – Private Partnership
(CII, Govt of Andhra Pradesh, USAID and Pirojsha Godrej Foundation)**

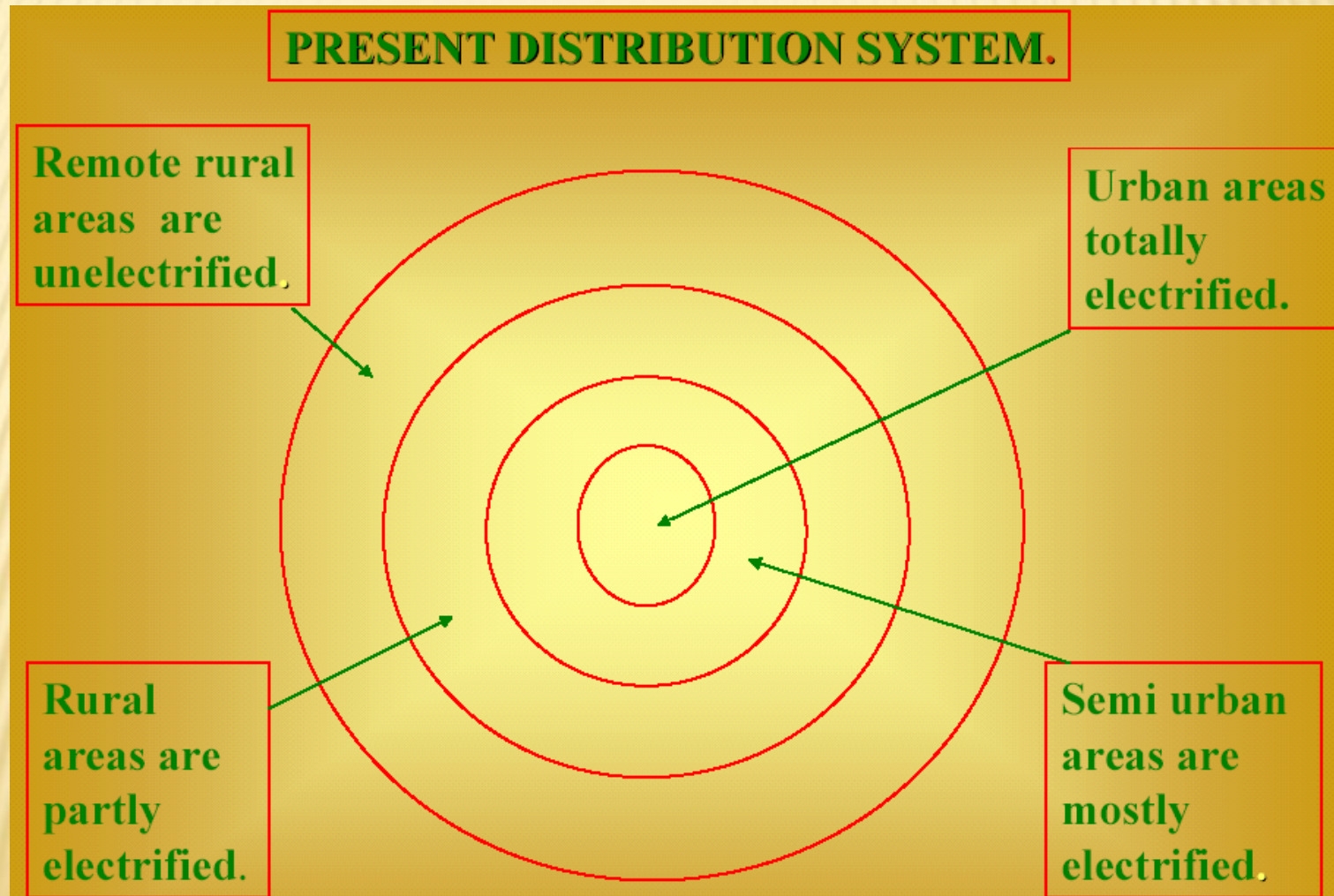


**CENTRE OF “EXCELLENCE” FOR ENERGY, ENVIRONMENT, GREEN BUILDINGS,
RENEWABLE ENERGY, WATER & CLIMATE CHANGE ACTIVITIES IN INDIA**

PACE-D

- ❖ US-India MoU in November 2009 outlines creation of Partnership to Advance Clean Energy (PACE).
- ❖ PACE to enhance collaboration on energy efficiency, renewable energy, and clean energy technology with co-benefits for climate change.
- ❖ Two components of PACE – A Joint Research Centre and a Deployment Centre
- ❖ PACE-D would *accelerate transition to high performing, low emissions and energy secure economy*.
- ❖ A ‘whole of government approach’, it would reflect combined resources.
- ❖ PACE-D would strengthen U.S.-India dialogue and raise bilateral cooperation on clean energy to new level.

PRESENT SCENE OF RURAL ELECTRICITY SYSTEM



NO POWER, BUT MOBILE PHONES



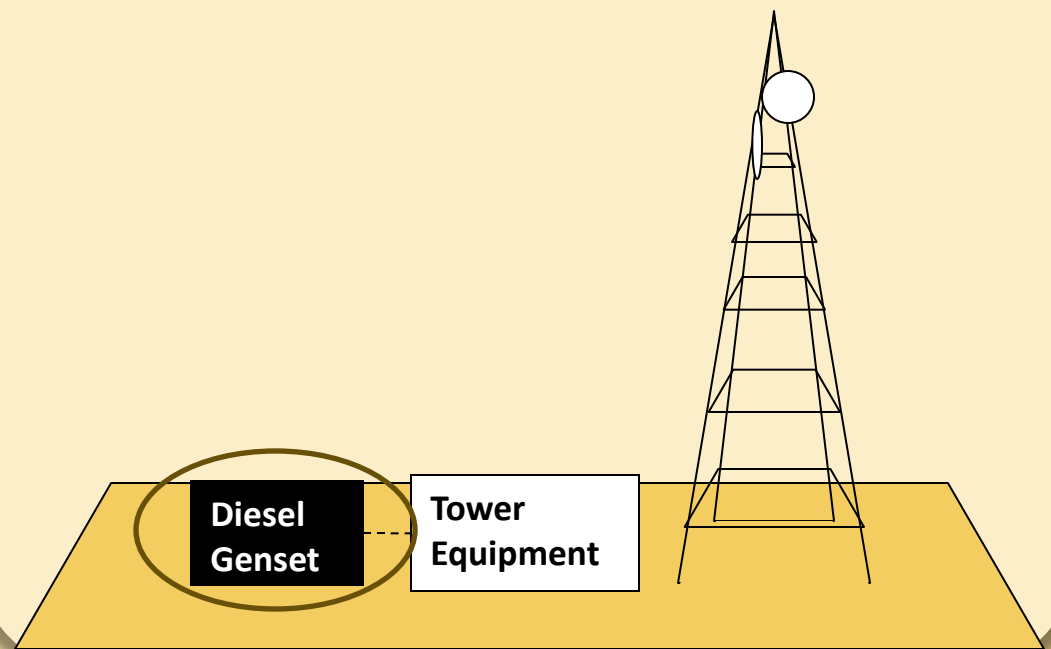
BIOMASS: AGRO-RESIDUES, WEEDS AND ENERGY PLANTS



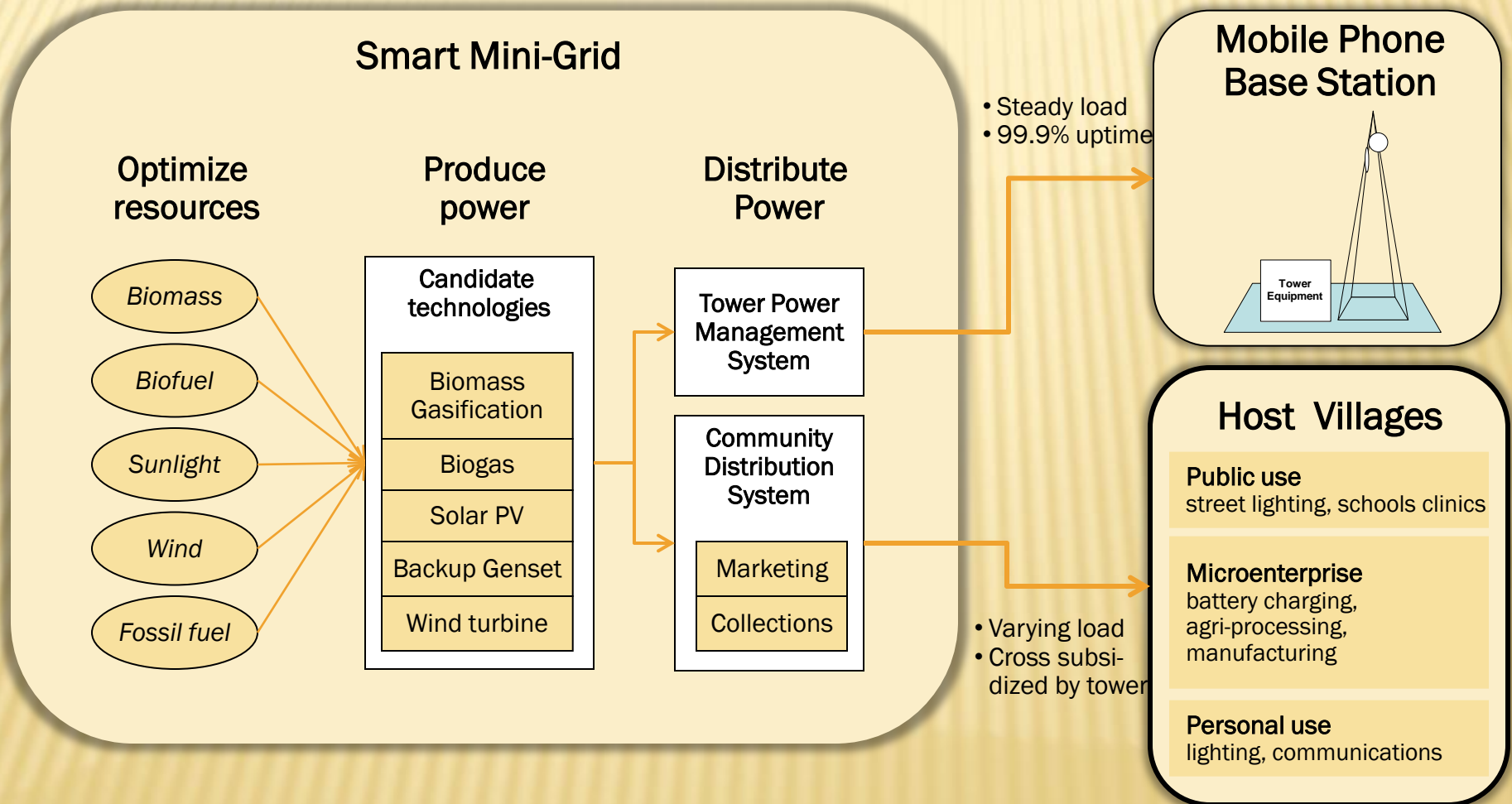
BASE STATION SITES RELY ON DEDICATED POWER SUPPLY

- Powered by diesel generator set
- This is a costly and polluting solution
 - Up to \$1/kWh total cost
 - CO₂ & black carbon emissions
- Local communities remain without clean energy services for economic and social development

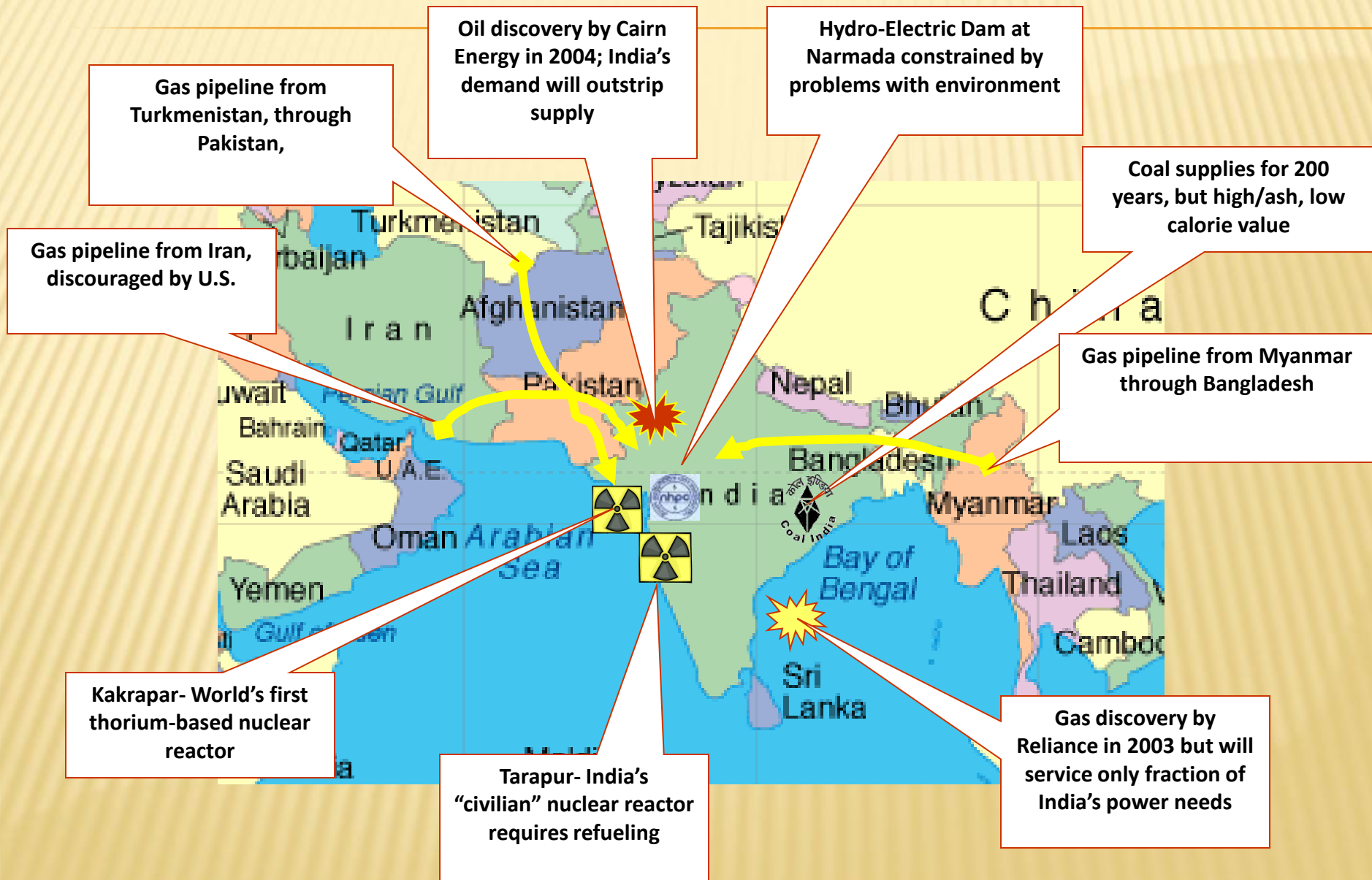
Typical Mobile Phone Base Station



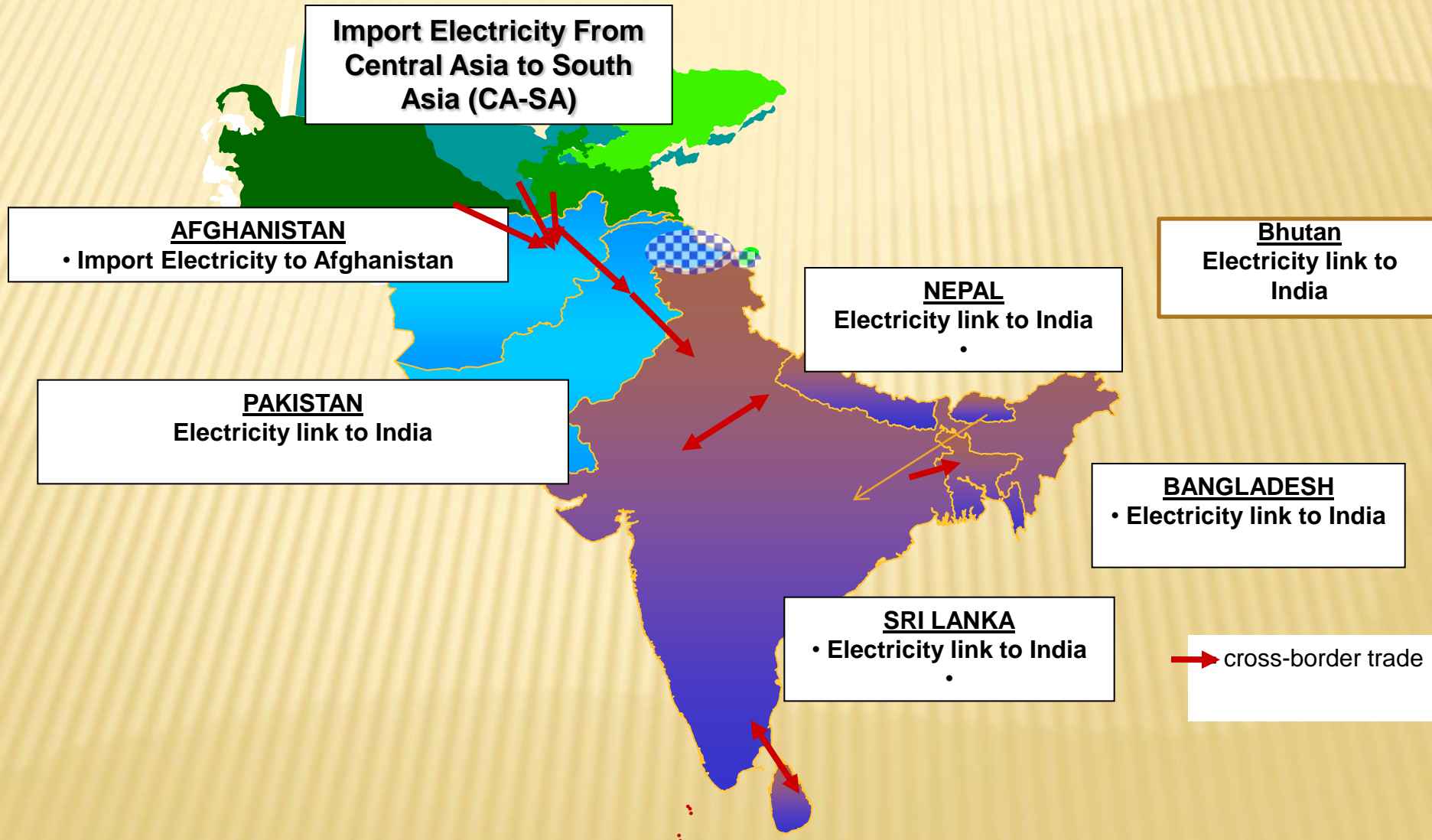
BASE STATIONS AS ANCHOR CUSTOMERS” FOR MINI-UTILITY SUPPLYING HOST VILLAGES



INDIA'S ENERGY SECURITY CHALLENGE



INDIA'S CROSS-BORDER POWER TRADE OPPORTUNITIES



THANK YOU

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